UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,552	10/26/2001	Bowie G. Keefer	6454-56838	1313

7590 01/14/2004

KLARQUIST SPARKMAN, LLP
One World Trade Center, Suite 1600
121 S.W. Salmon Street
Portland, OR 97204

EXAMINER	
MEDINA SANABRIA, MARIBEL	
ART UNIT	PAPER NUMBER
1754	

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	10/039,552	KEEFER ET AL.	
	Examiner	Art Unit	
	Maribel Medina	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43 and 45-86* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-43,45-73 and 77-86* is/are rejected.

7)☒ Claim(s) *74-76* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 October 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "208" (not in figures 1-5B). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: "105", "106", "132", and "180" (in Figure 1). A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 2 depends from claim 2, proper correction is required.

4. Claim 64 is objected to because of the following informalities: in line 1 after "fuel cell", --, comprising-- should be inserted. Appropriate correction is required.

5. Note that the original set of claims submitted does not include claim 44. Proper correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-12, 25, 26, 31-43, 45-48, 50, 55, 56, and 58-63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 is indefinite for use of improper Markush language. The phrase in lines 7-8 that reads "selected from a second adsorbent, a steam reforming catalyst, and a water gas shift reaction catalyst" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a second adsorbent, a steam reforming catalyst, and a water gas shift reaction catalyst--.

b. Claim 3 is indefinite for use of improper Markush language. The phrase in lines 19-21 that reads "selected from Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

c. Claim 9 is indefinite for use of improper Markush language. The phrase in lines 11-12 that reads "selected from a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

d. Claim 12 is indefinite for use of improper Markush language. The phrase in line 22 that reads "selected from a methanol steam reforming catalyst or a methane steam reforming catalyst" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a methanol steam reforming catalyst [or] and a methane steam reforming catalyst--.

e. Claim 25 is indefinite for use of improper Markush language. The phrase in lines 23-25 that reads "selected from Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

f. Claim 31 is indefinite for use of improper Markush language. The phrase in lines 5-7 that reads "selected from a second adsorbent, a steam reforming catalyst, and a water gas shift reaction catalyst" is confusing and renders the claim indefinite. The phrase

should be changed to --selected from the group consisting of a second adsorbent, a steam reforming catalyst, and a water gas shift reaction catalyst--.

g. Claim 38 is indefinite for use of improper Markush language. The phrase in lines 2-3 that reads "selected from Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

h. Claim 39 is indefinite for use of improper Markush language. The phrase in lines 7-8 that reads, "selected from a Cu-ZnO catalyst, a transition metal carbonyl complex catalyst, or a catalyst comprising a transition group metal inserted in a zeolite cage" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting a Cu-ZnO catalyst, a transition metal carbonyl complex catalyst, [or] and a catalyst comprising a transition group metal inserted in a zeolite cage--.

i. Claim 43 is indefinite for use of improper Markush language. The phrase in lines 21-22 that reads "selected from a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

j. Claim 50 is indefinite for use of improper Markush language. The phrase in lines 15-16 that reads "selected from a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

k. Claim 55 is indefinite for use of improper Markush language. The phrase in lines 14-16 that reads "selected from Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of Na-LSX, Ca-LSX, Ca-LSX, Li-LSX, Li-exchanged chabazite, Ca-exchanged chabazite, Sr-exchanged chabazite, a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

l. Claim 56 is indefinite for use of improper Markush language. The phrase in lines 20-22 that reads "selected from a Cu (I)-containing material, a Ag (I)-containing material, or a mixture thereof" is confusing and renders the claim indefinite. The phrase should be changed to --selected from the group consisting of a Cu (I)-containing material, a Ag (I)-containing material, [or] and a mixture thereof --.

m. Claim 58 is indefinite for use of improper Markush language. The phrases in lines 8; 11-12; and 16-17 that read "selected from a first compressor or first vacuum pump"; selected from a second compressor or second vacuum pump"; and "selected from the first

compressor, first vacuum pump, second compressor, second vacuum pump, or and electric generator" are confusing and render the claim indefinite.

n. Claim 61 recites the limitation "the coolant water". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-28, 31-43, and 45-56 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent Application Publication 2002/0110503 (Gittleman et al.).

Regarding claim 1, Gittleman et al. disclose a process for providing a hydrogen-containing gas to a fuel cell anode. The process comprises introducing a hydrogen-containing feed gas stream containing a contaminant into an adsorption module having a first adsorbent and a second material comprising a water gas shift catalyst thereby purifying the hydrogen-containing gas stream, and feeding the purified hydrogen into the anode of a fuel cell (see [0010]). Regarding claim 2, the contaminant is carbon monoxide and the adsorbent is a carbon monoxide selective adsorbent (see [0011]). Regarding claims 3 and 9, the carbon monoxide selective adsorbent may be a metal oxide or metal salt such as copper and silver impregnated on carbon, alumina or zeolite, among others known in the art (see [0044]). Regarding claim 4, the

temperature for the water gas shift reaction, if CuO/ZnO/alumina is used as a catalyst, is in the range from 150-250°C (See [022]). Regarding claim 5, additional adsorbents may be used (see [0042], [0043], and [0045]). Regarding claim 6, the adsorption module is a rotary pressure swing adsorption module (See [0010]). Regarding claims 7 and 19, the fuel cell is a polymer electrolyte membrane fuel cell (see [0002]). Regarding claims 8 and 18 the hydrogen is produced in a steam reforming or partial oxidation system (See [0003], and [0019]). Regarding claim 10, the adsorbent preferentially adsorbs carbon dioxide (see [0010]). Regarding claim 11, the adsorbent comprises a water gas shift catalyst and alkali–promoted material such as calcium (See [0042] and [0010]). Regarding claim 12, the limitations of the claim have been noted but not considered since they are only necessary if the steam reforming catalyst option of claim 11 is required. Regarding claims 13-17 and 20-28, Gittleman et al. disclose the separation of carbon monoxide, water vapor and carbon dioxide contaminants from the hydrogen-containing feed gas (see [0042], [0043] and [0045], in two different adsorptions zones of the adsorption module, therefore the limitations of the claims are met by Gittleman et al.

Regarding claims 31, and 49-56 Gittleman et al. disclose an electrical current system comprising: a hydrogen-containing gas source (1); an adsorption module including a first adsorbent and at least a second material such as a water gas shift catalyst or a second adsorbent (2); and a fuel cell (3) defining an anode inlet (14) (See Figure 2). Regarding claim 32 the hydrogen-containing gas source (10) is a reformer or a partial oxidation reactor (see [0019]). Regarding claims 33-35 Gittleman et al. disclose that the adsorption module is a rotary pressure swing adsorption module, comprising more than one adsorption zone (See [0042] and [0043]). Regarding claim 36, conduit (15) is a recirculation conduit of the anode waste gas between the

fuel cell anode outlet and an inlet in the adsorption module (See Figure 2). Regarding claims 37, 38 and 40-46 the system comprises carbon monoxide, water vapor and carbon dioxide adsorbents, wherein the carbon monoxide selective adsorbent may be a metal oxide or metal salt such as copper and silver impregnated on carbon, alumina or zeolite, among others known in the art (see [0044]); the water vapor adsorbent may be a desiccant (See [0045]) and the carbon dioxide adsorbent may be an alkali exchanged metal (see [0042]). Regarding claim 39, the water gas shift catalyst is CuO/ZnO/alumina (See [0022]). No difference is seen between the instantly claimed invention and Gittleman et al. disclosure.

10. Claims 29, 30 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent Application Publication 2002/0142198 (Towler et al)

Towler et al. disclose a process and system for providing a hydrogen-containing gas stream to a least one fuel cell anode. The process comprising: providing an oxygen-enriched gas stream (12); providing a mixture of the oxygen-enriched gas stream (14) and a fuel (1) in a partial oxidation reactor (104) to produce a hydrogen-containing gas stream that includes at least one carbon oxide contaminant; separating at least a portion of the carbon oxide contaminant from the hydrogen-containing gas stream (see [0028] and [0029]); and introducing the hydrogen-containing gas into the anode of a fuel cell (See Figure). The oxygen-enriched gas is produced by a pressure swing adsorption module (see [0037-0038]). No difference is seen between the instantly claimed invention and Towler et al. disclosure.

11. Claims 64, 65, 66, 69, 70, 78, 79, 85, and 86 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 6334862 (Matsumoto et al.).

Matsumoto et al. disclose a system and process for providing a hydrogen-containing gas stream to a fuel cell, comprising: providing a fuel cell (5) defining a coolant passage and an anode inlet (6) for receiving a hydrogen-containing gas stream (12); mixing liquid water and a hydrocarbon fuel stream resulting in a coolant mixture (17); introducing the coolant mixture in the coolant passage of the fuel cell; vaporizing the coolant mixture to form a steam /fuel vapor mixture (18); subjecting the steam/fuel vapor mixture (18) to reaction conditions sufficient for generating a hydrogen-containing gas stream(12); and introducing the hydrogen-containing gas stream into the fuel cell anode inlet (6) (See Figures 1 and 2 and the abstract). No difference is seen between the instantly claimed invention and Matsumoto et al. disclosure.

12. Claims 71 and 77 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 751045 (Abersfelder et al.). The following rejection is referred to the English Equivalent document US Patent Application 6,210,822 B1.

Abersfelder et al. disclose an electrical current generating system comprising: at least one hydrogen gas separation module (11) that includes a first outlet for discharging a purified hydrogen gas (14) and a second outlet for discharging a separation exhaust gas (15); at least one fuel cell defining an anode inlet (8) that fluidly communicates with the first outlet (14) of the hydrogen gas separation module; and a combustion engine (1) defining a fuel inlet (19) that fluidly communicates with the second outlet (15) of the hydrogen separation module (11) (See Figure). The fuel cell is a polymer electrolyte membrane (Se col.1, lines 55-67). No difference is seen between the instantly claimed invention and Abersfelder et al. disclosure.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 67, 68, 80, 82, and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al as applied to claims 64, 65, 66, 69, 70, 78, 79, 85, and 86 above, and further in view of Towler et al.

Matsumoto et al. apply herein as above. Matsumoto et al. disclose the instantly claimed invention, however, fail to disclose purifying the hydrogen-containing gas produced in steam reformer reactor (4) before introducing it to the fuel cell anode inlet (instant claim 67); fail to disclose the use of a pressure swing adsorption module (instant claims 68 and 80); fail to disclose an adsorption module that includes an outlet for discharging an oxygen-enriched stream, and a third conduit fluidly communicating between the pressure swing adsorption module outlet and a fuel cell cathode inlet (instant claim 82); and fail to disclose a first adsorption module including an outlet for discharging a purification exhaust gas, and the system further comprising a second pressure swing adsorption module that includes a first outlet for discharging an oxygen-enriched stream and a second outlet for discharging an enrichment exhaust gas, and a third conduit fluidly communicating between the purification exhaust gas outlet, the enrichment exhaust gas outlet, and at least one burner for the hydrogen gas generating module (instant claim 84).

Towler et al. disclose a process and system for providing a hydrogen-containing gas stream to a least one fuel cell anode. The process comprising: providing an oxygen-enriched gas stream (12); providing a mixture of the oxygen-enriched gas stream (14) and a fuel (1) in a partial oxidation /steam reforming zone (104) to produce a hydrogen-containing gas stream that includes at least one carbon oxide contaminant; separating at least a portion of the carbon oxide contaminant from the hydrogen-containing gas stream (see [0028] and [0029]); and introducing the hydrogen-containing gas into the anode of a fuel cell (See Figure). The oxygen-enriched gas is produced by a pressure swing adsorption module (Se [0037-0038]).

Regarding claims 68 and 80, Towler et al. disclose the use of a pressure swing adsorption module (see [0029]) to purify the produced hydrogen-containing gas. Regarding claim 82, Towler et al. disclose an adsorption module (101) that includes an outlet for discharging an oxygen-enriched stream (12), and a third conduit (16) fluidly communicating between the pressure swing adsorption module (10) outlet and a fuel cell cathode inlet (16, C). Regarding claim 84, Towler et al. disclose a first adsorption module including an outlet for discharging a purification exhaust gas (See [0029]), and the system further comprising a second pressure swing adsorption module (102) that includes a first outlet for discharging an oxygen-enriched stream (24) and a second outlet for discharging an enrichment exhaust gas, and a third conduit fluidly communicating between the purification exhaust gas outlet, the enrichment exhaust gas outlet, and at least one burner (108) for the hydrogen gas generating module (104).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the oxygen-enrichment pressure swing adsorption module and hydrogen-containing pressure swing adsorption module of Towler et al. in Matsumoto et al. process and

system, since Towler et al. disclose that it is desirable to feed a high purity hydrogen-containing feed gas to a fuel cell anode and an enriched oxygen-containing stream to the fuel cell cathode to improve the performance of the fuel cell by increasing the efficiency of the electrochemical reactions and increasing the driving forces for those reactions in a PEM fuel cell (See [0029] and [0040]).

15. Claims 72 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aberfelder et al. as applied to claims 71 and 77 above, and further in view of Gittleman et al.

Abersfelder et al. apply herein as above. Abersfelder et al. disclose the claimed system; however fail to disclose that the hydrogen separation module comprises a rotary a pressure swing adsorption module.

Gittleman et al. disclose the use of a rotary pressure swing adsorption module for separating contaminants from hydrogen-containing gases.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a rotary pressure swing adsorption module as a hydrogen separation module in Aberfelder et al. system, since Gittleman et al disclose the advantages of using such system in an automotive system as compared to a fixed PSA (see Gittleman et al. [0026]).

16. Claims 81 and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. further in view of Towler et al. as applied to claims 67, 68, 80, 82, and 84 above, and further in view of Gittleman et al.

Masumoto et al. in view of Towler et al. apply herein as above. The combination of references discloses the claimed system; however fail to disclose that the hydrogen separation module comprises a rotary a pressure swing adsorption module.

Gittleman et al. disclose the use of a rotary pressure swing adsorption module for separating contaminants from hydrogen-containing gases.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a rotary pressure swing adsorption module as a hydrogen separation module in the combination of references system, since Gittleman et al. disclose the advantages of using such system as compared to a fixed PSA (see Gittleman et al. [0026]).

Allowable Subject Matter

17. Claims 74-76 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claims 58-63 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

19. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 58-63, the closest prior art (Towler et al) disclose: A process for providing a hydrogen-containing gas stream and an oxygen-enriched gas stream to a fuel cell, comprising: providing at least one first pressure swing adsorption module that produces an oxygen-enriched gas stream, the first pressure swing adsorption module including at least one device selected from a first compressor or first vacuum pump; providing at least one second pressure swing adsorption module that produces a purified hydrogen gas stream and a separation exhaust gas stream, the second pressure swing adsorption module including at least one device selected from a second compressor or second vacuum pump; introducing the oxygen-enriched gas stream and the purified hydrogen gas stream into a fuel cell. However fail to disclose or suggest introducing

the separation exhaust gas stream as a fuel into a combustion engine for driving at least one device selected from the first compressor, first vacuum pump, second compressor, second vacuum pump, or an electric generator.

Regarding claims 74-76, the prior art fails to disclose or suggest: The system further comprising at least one first pressure swing adsorption module that includes an outlet for discharging an oxygen-enriched gas stream and at least one compressor or pump, wherein a shaft coupled to the combustion engine drives at least the compressor or pump. The system wherein the fuel cell further defines a cathode outlet for discharging a cathode exhaust gas stream that includes water, the combustion engine further includes a cooling jacket, and the system further comprises a conduit fluidly communicating between the fuel cell cathode outlet and the combustion engine cooling jacket. And, the system further comprising a hydrogen gas generating system that fluidly communicates with the hydrogen gas separation module, wherein the hydrogen gas generating system comprises a reformer or partial oxidation reactor and the combustion engine further includes a cooling jacket that defines an outlet for a water stream that fluidly communicates with the reformer or partial oxidation reactor.

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maribel Medina whose telephone number is (571) 272-1355. The examiner can normally be reached on Monday through Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-0994.

Maribel Medina
Examiner
Art Unit 1754